DOCUMENT RESUME

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TITLE	Teaching of Computation of Whole, Integral, Rational and Real Numbers (One of a Series). Description of Teacher Inservice Education Materials.
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ABSTRACT

The described learning module is designed for teachers at the middle school level who wish to improve specific basic mathematics teaching skills. The contents of the module are outlined, and activities and resources involved in its use are described. Ordering information for materials is included, and a critique of the module is provided. (JD)

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ED173274

DESCRIPTION OF TEACHER IN-SERVICE EDUCATION MATERIALS

A. SUMMARY INFORMATION

Title: TEACHING OF COMPUTATION OF WHOLE, INTEGRAL, RATIONAL AND REAL NUMBERS (one of a series)

Publication Date(s): 1974

Intended Users: Inservice teachers

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Grade Level(s): Grades 5-8

Number: Individual or group

Primary Focus: Helping teachers develop or improve specific basic math teaching skills is the focus of the product.

School subject(s) and/or in-service topic(s) covered:

The general objective of this module is to help participant determine whether s/he has both knowledge of and ability to teach arithmetical computation from whole numbers through rational numbers. The module contains Rationale, Objectives, Evaluations, Bibliography and Activities of the course. Module can be taken for in-service credit, in which case there should be a facilitator.

What participant does in using the materials:

Participant reads module and follows activities in sequence. Following self-analysis, s/he takes the pre-test and undertakes enabling activities wherever necessary. This can be done individually or in small groups. (Answers to pre-test and post-test are given at the end of each activity.)

Resources:

A 54-page (and about 30 pages in the appendix) mimeographed booklet is the basic resource. Some tools (i.e., cuisenaire rods, abacus, ruler, compass, number line, etc.) are also needed. Some additonal reading material would be most helpful in order to complete the module successfully, such as Booklets Nos. 4,6,7,9 and 11 of the National Council of Teachers of Mathematics Series. Other readings and filmstrips are recommended and are listed in the bibliography.

Describer critique:

This is an excellent module, which is clearly written and well organized. It is competency-based and provides for good self-evaluation. It is part of a 22 module project which could be taken for in-service credit.

SP013 774

middle school math - addition-subtraction/multiplication-division - ratio, square root, decimals, percents

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B. In-depth Information

1.0 PURPOSES:

It is the intent of this module that after completion, the teacher will be able to "demonstrate knowledge and teaching of arithmetical computation of whole, integral, rational and real numbers."

The rationale for the development of the sequence is that, according to the developer: "Even though calculating devices such as cash registers and electronic computers have taken over computing tasks, computational skills are essential for the following purposes: 1) To facilitate the learning of new math concepts; 2) To perform many tasks in the home, on the job,...etc.; 3) To promote productive thinking in problem-solving, research, and other creative activities; 4) To provide insights into the structure of our number system."

Upon completion of this module, a teacher should be able to demonstrate knowledge of and ability to:

1) teach algorithms of addition, subtraction, multiplication and division of whole numbers by various methods;
2) teach addition, subtraction, multiplication, and division of integers by various methods;
3) teach addition, subtraction, multiplication and division involving rational numbers by various methods;
4) teach addition, subtraction, multiplication and division with decimals and percent by various methods;
5) teach ratio and proportion by various methods; and
6) find square root by various numbers.

Providing middle school teachers with mathematics skills most necessary to meet the stated objectives of the math curriculum, was the main objective in the development of this 22-module mathematics series.

2.0 CONTENT — Scope and Sequencing of Topics:

The specific objectives covered in this module relate to algorithms, integers, rational numbers, decimals, percent, ratio, proportion and square root. The format is as follows:

Table of Contents:

Rationale pp.1-2
General Objective p.3
Specific Objective pp.3-4
Self-Analysis p.5
Pre-test pp.6-13
Pre-test Answers pp.14-26
Analysis Chart p.27
Enabling Activities pp.28-38
Post-test p.39
Post-test Answers pp.42-48
Bibliography pp.49-52
Cross References pp.53-54
Appendices (30+ pages)
A. Individual Games and Puzzles
B. A Sample Lesson on Percent
C. Predict the Pattern - Decimal Fractions
D. The System of Integers
E. Scale, Rate and Ratio
F. Strategies for Teaching Mathematical Concepts of Square Root
G. Finding Square Root by Averaging

Topics are followed in sequence; only if participant finds it necessary to follow enabling activities in order to complete pre-test successfully. Otherwise, only those areas in which skills are found wanting must be covered.

3.0 ACTIVITIES AND RESOURCES INVOLVED IN USE OF PRODUCT

3.1 Description of main in-service activities:

Teachers read the rationale and objectives of the training module and proceed to the self-analysis by which they determine their competency in the areas to be covered. Should they find that they may need help in one or more of the five objectives, they take the appropriate pre-test, or turn to the enabling activities for that objective. (The answers to the pre-tests are given in the back of the self-analysis section.) The enabling activities lead teachers to source material (books and tapes), as well as to specific activities, such as developing a lesson plan or designing a teaching unit.

3.2 Help given in use of product:

The product is made up of the booklet and additional Module 3 consumables (Self-Analysis, Pre-test, Pre-test Answers, Post-test and Post-test Answers). Neither the "helpful" material nor the "recommended" material is included, but it is listed in bibliographies and said to be readily available. Teachers must also provide their own minimal equipment (i.e., ruler, compass, etc.) needed for computation.

4.0 EVALUATION OF TEACHER INSERVICE LEARNING

Comprehensive Pre and Post-tests for each of the areas covered are included, allowing for effective evaluation of inservice learning.

5.0 ORDERING INFORMATION

5.1 Resources required/recommended: items or persons to be secured are: 1 module (could be used by up to six teachers) and one consumable booklet per user,& a resource person (could be math supervisor) to act as consultant. If no other source material is available, appendices could be used as reference. Recommended and helpful materials are listed in the module. Most are available in any school Resource Center.

This module can be done individually or in a small group.

5.2 Distributor name/address:

Panhandle Area Educational Co-op. (PAEC)
411 West Boulevard, South
Chipley, Florida 32420

Director, Lester Kitchings
(906) 638-4131

5.3 Components/approximate costs:

Component	Purchase	Rental	No. Req.	Reusable
TEACHING OF COMPUTATION OF WHOLE, INTEGRAL, RATIONAL AND REAL NUMBERS	$2.40 TOTAL			
Module	$1.80		1 for each group of ±6	Yes
Consumable	$ .60		1 per person	No

Note

A set of all 22 modules (Middle School Math Project) is available for $35.05, and a set of consumables at $6.65.

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6.0 HISTORY OF DEVELOPMENT

6.1 Identification of the developer:

Dr. Donald H. Bernard, University of Florida, is the Project Director. He is Associate Professor for Mathematics Education, Nursery through grade 8, University of Florida. He received his master's and Ph.D. from Columbia University, New York City.

Teachers can call him at: (904) 392-0761
392-2327

6.2 How developed and when:

The developer gives this brief accounting in the materials:

"This module is one of a series of 22 developed under a contract between the Florida State Department of Education, Research and Development Division, and the University of Florida, Childhood Education Department, under whose supervision it was written. The major input to the project came from a consortium of middle school math teachers at the elementary and secondary levels, University faculty, students, Florida Department of Research and Development, and county administrators. It was field tested in eleven counties and revised accordingly over a two year period (1973-1974).

6.3 Evidence of effectiveness with users:

There has been much informal positive feedback on the completed module. In the course of its development, the module was used by math teachers from eleven counties who made comments and reacted positively.

An evaluation report is available documenting this research. The developer states that Module 5 (math games and activities) and 17 (metric system) are highly popular among math teachers.

C. DESCRIBER CRITIQUE

Appropriateness / adaptability / technical quality:

It would seem that a program such as this one would meet the need of many math teachers to evaluate their own performance in particular areas of the math curriculum and gain skills wherever needed. It can be followed by individuals and is also adaptable to group use, with the services of a facilitator or resource person. It is clear, concise, easy to follow.

Content accuracy/social fairness/community acceptance issues:

Because of its nature (math theory) the subject matter cannot be evaluated as to social fairness or community acceptance issues. The pronoun references in the module are careful to indicate both genders, thus indicating concern for avoidance of sexual bias.

Overall summary/comment:

This module appears to cover the material clearly and systematically and seems to meet its stated objectives.

One aspect which should be most welcome to its users is that it is competency-based, and does not require the participant to cover material with which s/he is already familiar. This permits the individual need of the users to be met, without having them waste time or effort performing tasks in areas of strength. All the readings, activities and evaluations combine to make an effective training program for teachers.